



# **The evaluation of singing voice accuracy: How tolerant are we?**

BAPS

28.05.13

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# What is « in tune » ?

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Accurate version



Contour error at the note 2



Interval errors of 200 cents between notes 1-2 and 2-3



Tonality modulation at the note 2

# What is important ?

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## □ Music experts

- ▣ 81% of the judges' rating explained by interval and tonality criteria

**Larrouy-Maestri et al. (2013) The evaluation of singing voice accuracy: a comparison between subjective and objective methods. J. Voice, 27(2), 1-5**

## □ Non experts

- ▣ 66% of the judges' rating explained by the interval criterion

**Larrouy-Maestri, P., & Morsomme, D. (in preparation). Are we good judges even if we are not musicians ?**

# Which threshold ?

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## □ Semi tone

E.g. Berkowska & Dalla Bella, 2007,2009; Dalla Bella et al., 2007, 2009a, 2009b; Pfordresher & al., 2007,2009, 2010

**=> Musical**

## □ Quater tone

E.g. Hutchins & Peretz; 2012; Hutchins, Roquet, & Peretz, 2012

**=> Discrimination**

**In a melodic context ?**

**Effect of the familiarity ?**

Yes (Kinney, 2009)

No (Warrier & Zatorre, 2002)

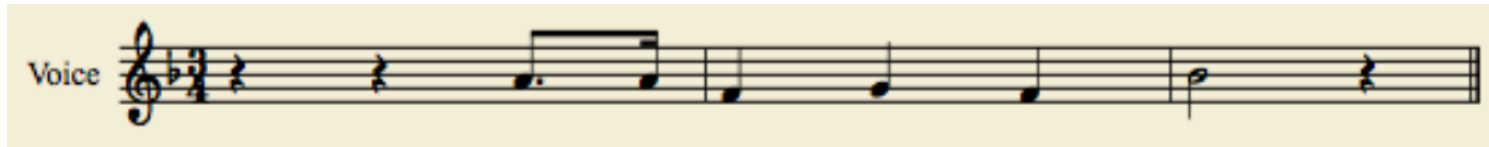
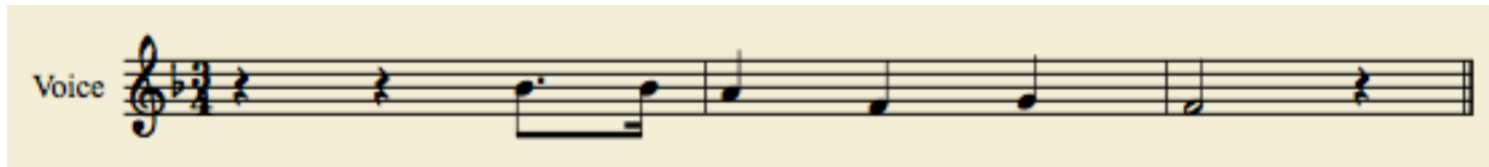
# How tolerant are we ?

# Methods

## Material

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### □ Two mélodies



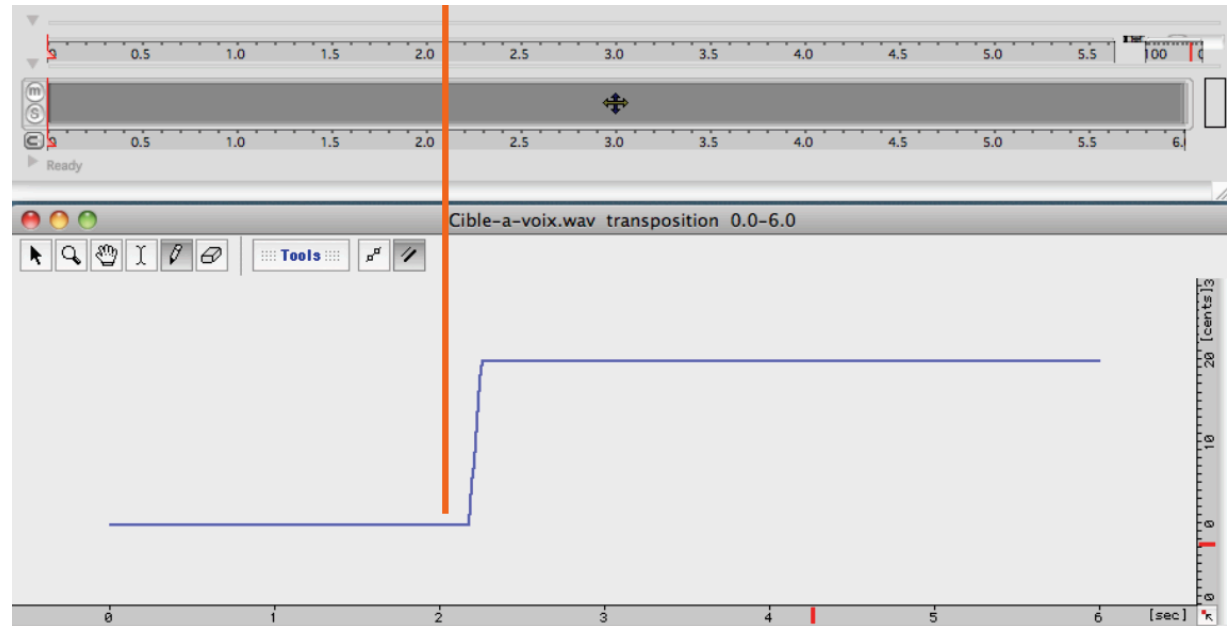
### □ Familiarity ?

- Online questionnaire
- 399 participants from 13 to 70 years old ( $M = 29.81$ )
- $t(398) = 20.92, p < .001$

# Methods

## Material

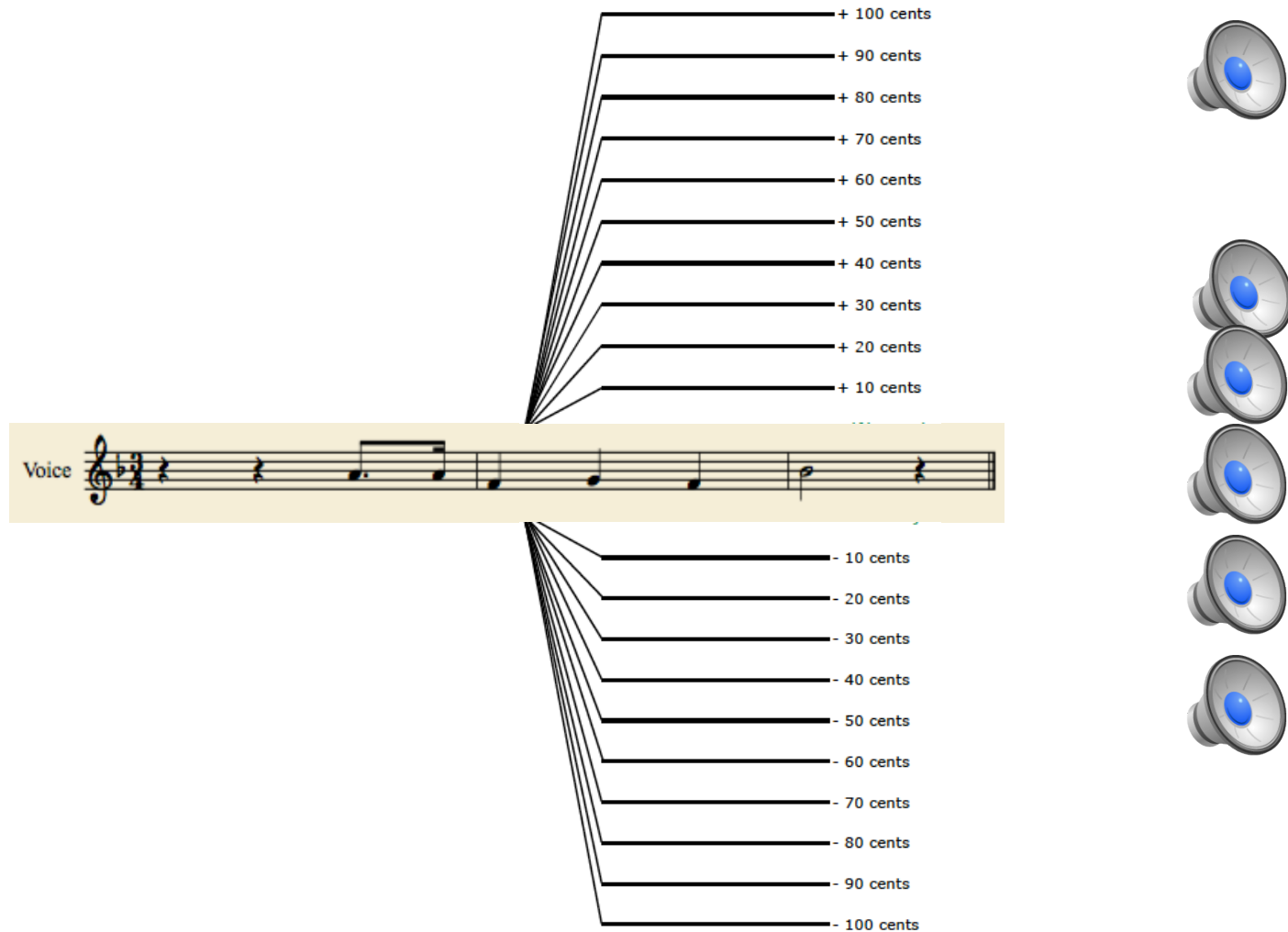
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# Methods

## Material

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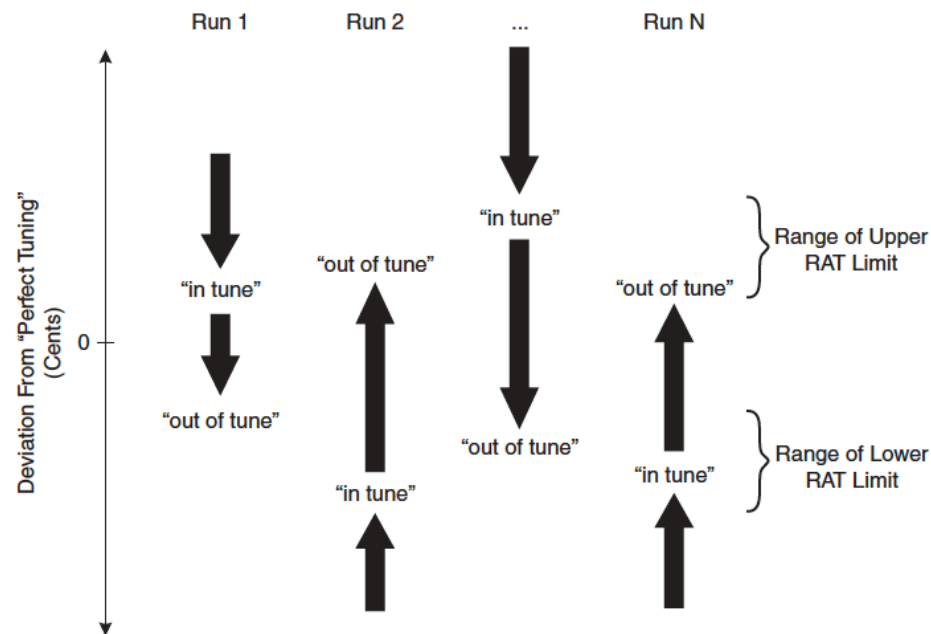


# Methods

## Participants and procedure

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- 30 non musicians ( $M = 21.33$  years;  $SD = 2.45$ )
- Two times : 8-15 days
- Method of limits (van Besouw & Howard, 2008)



# Results and discussion

## Judges reliability

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### □ Comparison test-retest

Familiar

	Test M(SE)	Retest M(SE)	R Pearson	Comparison
Enlargement	15.43 (1.24)	17.33 (1.12)	.69**	T(29) = 2.04, ns
Compression	26.07 (1.98)	23.40 (1.66)	.82**	T(29) = 2.36*
Tolerance	41.50 (2.50)	40.73 (1.89)	.82**	T(29) = 0.54, ns

Non Familiar

	Test M(SE)	Retest M(SE)	R Pearson	Comparison
Enlargement	17.20 (1.33)	17.80 (1.12)	.68**	T(29) = 0.60, ns
Compression	25.30 (1.84)	22.23 (1.46)	.84**	T(29) = 3.03**
Tolerance	42.50 (2.05)	40.03 (1.95)	.80**	T(29) = 1.93, ns

▣ Good intra-judges reliability

▣ Learning effect ?

# Results and discussion

## Judges reliability

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- Correlation matrix between the judges
  - ▣ Enlargement and compression
  - ▣ % of significant correlations between 0.8 and 1

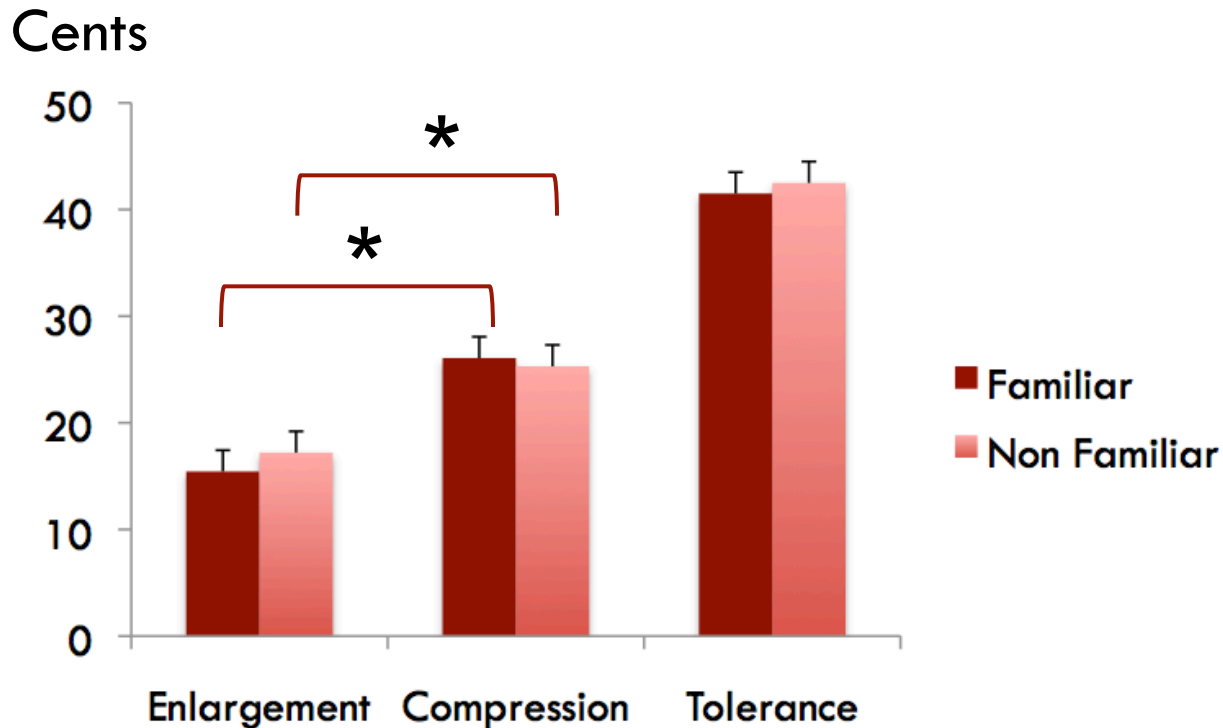
	Familiar	Non Familiar
Test	66.44	71.03
Retest	72.64	71.72

- ▣ **Good inter-judges reliability**
- ▣ **Learning effect ?**

# Results and discussion

## Familiarity and direction

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❑ No effect of the familiarity

❑ Effect of the direction of the error

Familiar:  $t = -4.94, p < .001$

Non Familiar:  $t = -3.27, p = .003$

# Conclusions

## How tolerant are we ?

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- Less tolerant than what searchers thought !
  - ▣ < quarter tone
  - ▣ Particularly when the interval is enlarged
  - ▣ Whatever the melody
  
- Experimental perspectives
  - ▣ No effect of the familiarity
  - ▣ Efficient method to understand music perception
    - Context or size effect
    - Ability of non musicians // music experts
  - ▣ Pertinence of analytical tools

# The evaluation of singing voice accuracy

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# The evaluation of singing voice accuracy

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**THANK YOU FOR YOUR  
ATTENTION**

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